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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/750,925 | 12/30/2003 | Young-Joo Yee | 2080-3-214 | 1919 |

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| EXAMINER | |
|---|---|
| SONG, SARAH U | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2874 | |

DATE MAILED: 07/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/750,925 | YEE, YOUNG-JOO | |
| | Examiner | Art Unit | |
| | Sarah Song | 2874 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *27 April 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *16-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1. Applicant's communication filed on April 27, 2006 has been carefully considered and placed of record in the file. Claims 1, 6, 8, 9, 14 and 15 have been amended. Claims 1-20 are pending. Claims 16-20 have been withdrawn from further consideration.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flanders et al. (U.S. Patent 6,768,756 previously relied upon).**

4. Regarding claims 1 and 6, Flanders et al. discloses a lower substrate 112; a plane mirror formed at one surface of the lower substrate 112; an upper substrate 110 coupled to the lower substrate with a certain gap; a concave mirror 250 formed at one surface of the upper substrate for forming a resonance cavity of a hemispherical shape with the plane mirror; and a micro actuating means for controlling a gap of the resonance cavity. Furthermore, it is noted that the upper and lower substrates of Flanders are aligned as shown in Figure 1.

5. Flanders et al. does not expressly disclose the substrate 112 to be transparent for light penetration.

6. Flanders et al. does disclose that the curved reflector may be used as a back reflector (column 4, lines 44-46). Therefore, One of ordinary skill in the art would have recognized the need to provide the substrate 112 as a transparent substrate for light penetration. Therefore, it

would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a transparent lower substrate for the purpose of providing a back reflecting resonator, as suggested by Flanders et al.

7. Flanders et al. also does not expressly disclose wherein the lower substrate and the upper substrate are bonded. However, it is well known in the art to bond respective substrates in alignment for the purpose of providing structural robustness. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to bond the upper substrate and lower substrate of Flanders et al. for robustness.

8. Regarding claim 7, the upper substrate comprises a fixed frame 212 coupled to an edge of one surface of the lower substrate; a movable part 218 disposed in the fixed frame and having the concave mirror at one surface thereof; and a plurality of elastic supporting elements 220 for making the movable part be elastically supported at the fixed frame.

9. Regarding claim 8, Flanders et al. discloses an electrostatic actuating means (claim 8), but does not expressly disclose the micro actuating means comprising a first electrode formed at one surface of the movable part that the concave mirror is formed, a second electrode formed at the lower substrate to face the first electrode with a certain gap; and a voltage source. However, such micro actuating means are well known with the art of MEMS devices. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the any well known MEMS actuating means, including a first and second electrode, and voltage source as claimed since Applicant has not disclosed that the particular actuating means solves any problem or is for any particular purpose, and it appears that the invention would perform equally well with any known MEMS actuator.

10. Regarding claims 9 and 14, Flanders et al. discloses wherein the plurality of elastic supporting elements are symmetrically formed as a radial shape between the fixed frame and the movable pad so that the concave mirror can be moved in a vertical direction (column 3, lines 61-63). Furthermore, it is noted that a position of the concave mirror is a position where a restoration force of the plurality of elastic supporting elements which is increased in proportion to a displacement of the movable part becomes equal to said electrostatic force.

11. Regarding claims 2 and 10, Flanders et al. does not expressly disclose the curvature radius of the concave mirror is larger than a distance between the concave mirror and the plane mirror. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the curvature radius to be larger in order to ensure proper coupling between the reflective facets.

12. Regarding claims 3 and 11, the concave mirror is formed by stacking hetero dielectric thin film layers having different refractive indexes (column 4, lines 9-11).

13. Regarding claims 4 and 12, Flanders et al. does not expressly disclose the plane mirror to be a semitransparent mirror formed stacking hetero dielectric thin film layers having different refractive indexes. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the plane mirror in the same manner as the concave mirror in order to simplify manufacture. It also would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a semitransparent mirror for operation of the resonator in a back reflection mode, as discussed previously.

14. Regarding claims 5 and 13, Flanders et al. does not expressly disclose an AR layer on one surface of the lower substrate onto which incident light is made to be incident. AR layers on

incident facets of an optical resonator are well known in the art. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide an AR layer on the one surface of the lower substrate in order to maximize the amount of light coupled into the resonator.

15. **Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Flanders et al. in view of Jian (U.S. Patent Application Publication 2003/0002809 previously relied upon).**

16. Regarding claim 15, Flanders et al. discloses a lower substrate 112; a plane mirror formed at one surface of the lower substrate 112; an upper substrate 110 coupled to the lower substrate with a certain gap; a concave mirror 250 formed at one surface of the upper substrate for forming a resonance cavity of a hemispherical shape with the plane mirror; and a micro actuating means for controlling a gap of the resonance cavity. Furthermore, it is noted that the upper and lower substrates of Flanders are aligned as shown in Figure 1.

17. Flanders et al. does not expressly disclose the substrate 112 to be transparent for light penetration.

18. Flanders et al. does disclose that the curved reflector may be used as a back reflector (column 4, lines 44-46). Therefore, One of ordinary skill in the art would have recognized the need to provide the substrate 112 as a transparent substrate for light penetration. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a transparent lower substrate for the purpose of providing a back reflecting resonator, as suggested by Flanders et al.

19. Flanders et al. also does not expressly disclose wherein the lower substrate and the upper substrate are bonded. However, it is well known in the art to bond respective substrates in alignment for the purpose of providing structural robustness. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to bond the upper substrate and lower substrate of Flanders et al. for robustness.

20. Flanders et al. also does not expressly disclose an input optical fiber, an output optical fiber, an optical fiber alignment/assembly unit and a lens disposed between the lower substrate and the optical fiber alignment/assembly unit.

21. Jian discloses an optical filter comprising a tunable FP resonator 1161, an input optical fiber, an output optical fiber, an optical fiber alignment/assembly unit and a lens.

22. Jian is analogous art as pertaining to tunable optical resonators.

23. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the resonator of Flanders et al. to additionally comprise the input fiber, output fiber, optical fiber alignment/assembly unit and lens of Jian.

24. One of ordinary skill in the art would have been motivated to make the modification in order to provide the tunable resonator of Flanders for use in optical fiber communications for signal processing, filtering, etc.

***Response to Arguments***

25. Applicant's arguments filed April 27, 2006 have been fully considered but they are not persuasive.

26. Applicant states that the Examiner made no identification of the micro actuating means. Examiner respectfully disagrees and notes ¶15 of the previous Office Action.

27. Applicant further states that the spacer device 114 does not comport with Applicant's specification. The Examiner has not equated the spacer 114 to the micro actuating means. One of ordinary skill in the art would have recognized the actuating means of Flanders (as discussed in column 5, lines 12-15 and claims 6 and 8 of Flanders) as the micro actuating means. Furthermore, an electrostatic cavity is well known in the art as comprising a parallel plate capacitor, and thus fully meets the claimed limitation.

28. Furthermore, Applicant states that Flanders does not teach an optical resonator. In response to applicant's arguments, the recitation of an optical resonator has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Furthermore, a recitation of the intended use of the claimed invention (e.g. "for forming a resonance cavity") must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Nonetheless, Flanders et al. discloses a Fabry-Perot device (column 3, lines 33, 35; column 4, lines 3, 8, 14). Fabry-Perot cavities are resonant cavities, and therefore constitute an optical resonator.

29. Regarding the newly added limitation of claims 1, 6 and 15, the modification would have been obvious as set forth in the rejection above.

***Conclusion***

30. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarah Song whose telephone number is 571-272-2359. The examiner can normally be reached on M-Th 7:30am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on 571-272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sarah Song
Primary Examiner
Group Art Unit 2874